SCIENCES & BIOENGINEERING SCIENCES

The Research Group

Software Languages Lab (DINF-SOFT)

has the honor to invite you to the public defense of the PhD thesis of

Florian Myter

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

Triumvirate: A Programming Language Design for Distributed Rich Internet Applications

Promotor:

Prof. Dr. Wolfgang De Meuter

Prof. Dr. Christophe Scholliers

The defense will take place on

Wednesday 18 December at 17:00

in Auditorium E.0.09 at the Campus Humanities, Sciences and Engineering of the Vrije Universiteit Brussel, Pleinlaan 2 - 1050 Elsene, and will be followed by a reception.

Members of the jury

Prof. Dr. Viviane Jonckers (VUB, chairman)
Prof. Dr. Beat Signer (VUB, secretary)
Prof. Dr. Kris Steenhaut (VUB)
Prof. Dr. Theo D'Hondt (VUB)
Prof. Dr. Heather Miller (Carnegie Mellon University)
Prof. Dr. Guido Salvaneschi (Technische Universität Darmstadt)

Curriculum vitae

Florian Myter acquired his Master's degree in Applied Sciences and Engineering Computer Science (specialization Software Engineering) in 2014. Afterwards, he started a PhD at the Software Languages Lab of VUB. His work focuses on the design and development of programming languages that enable developers to combine distributed application state with various consistency requirements. The results of his research have been published in a book chapter, a journal paper, a full conference paper and 7 short conference papers. He presented these results at international, peer-reviewed conferences.

Abstract of the PhD research

With the advent of JavaScript, at the turn of the century web applications were developed using the traditional client-server model. These applications were developed using distributed programming models in which programmers can express that a particular part of their application's state is local or remote within the executing code. In contrast, modern so-called distributed rich internet applications (DRIAs) distribute both their application logic and state across multiple servers and clients. In these applications the distinction between local and remote application state no longer holds. For example, a DRIA's clients and servers require parts of the distributed global state to be locally available.
This lack of expressiveness on behalf of distributed programming models unnecessarily burdens programmers. More precisely, programmers are forced to tackle the distribution of both logic and state across multiple clients and servers using distributed programming models that lack the necessary abstractions. For example, this requires programmers to manually synchronise the parts of the application's state distributed across the clients.
In this dissertation we present Triumvirate, a DSL tailored towards the development of DRIAs. Triumvirate provides data types specifically designed to represent various kinds of distributed state. These data types differ in the way they behave under concurrent updates and in their parameter passing semantics. Moreover, Triumvirate provides abstractions that allow programmers to deploy application logic across multiple servers and clients.
Concretely, Triumvirate provides a multitude of data types that allow programmers to implement distributed state with various consistency guarantees. Triumvirate automatically enforces these guarantees using state-of-the-art consistency mechanisms. Moreover, Triumvirate also allows for the implementation of distributed reactive state.
To do so we develop a novel propagation algorithm for decentralised reactive programs. We validate the different facets of Triumvirate through various proofs, benchmarks and real-life use cases.